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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,657	03/29/2004	Chih-Ta Wu	67,200-1255	2448

7590 12/14/2005

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EXAMINER	
TRINH, MICHAEL MANH	

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/811,657	WU ET AL.	
	Examiner	Art Unit	
	Michael Trinh	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

*** This office action is in response to filling of the application on March 29, 2004.

Claims 1-20 are pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuki et al (6,919,273) taken with Olewine et al (2003/0067023).

Re claims 1,9, Otsuki teaches a method for forming an MIM capacitor, comprising: providing a substrate; providing a capacitor opening in said substrate (Figs 2-8); providing a bottom electrode (67 in Fig 7, col 10, lines 16-52); 62,63 in Figs 5-6,8,4; col 9, line 50 through col 10) in said capacitor opening; providing a dielectric layer 64 on said bottom electrode; and depositing a top electrode (66 in Figs 7,6; 65/68 in Figs 5,8) on said dielectric layer 64. Re claims 2,4,6,8,10,14, wherein the top electrode 66 deposited from thermal CVD by using $TiCl_4$ is substantially organic-free content (col 7, lines 56 through col 8; col 6, line 65 through col 7, lines 55). Re claims 5,12,16, wherein the electrode is deposited at a temperature including about 400°C (col 14, lines 30-35; col 8,lines 35-41). Re further claims 9,13, as similarly applied to claim 1, wherein the electrodes are deposited by thermal CVD deposition so that it is plasma-free deposition process (col 6, line 65 through col 8).

Otsuki teaches forming the bottom electrode, but lacks annealing the bottom electrode (re claim 1) with nitrogen (re further claims 3,7,11,14).

However, Olewine teaches (at paragraphs 55; 50-58; Figs 1-5) annealing a capacitor bottom electrode of TiN with nitrogen prior to deposition of the insulation layer of the capacitor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the capacitor of Otsuki by annealing the bottom electrode of TiN with nitrogen as taught by Olewine. This is because of the desirability to treat the TiN electrode layer to reduce or eliminate oxidation of the surface prior to and during deposition of the dielectric layer of the capacitor.

3. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuki et al (6,919,273) taken with Olewine et al (2003/0067023), as applied to claims 1-16 above, and further of Iizuka (2002/0190294).

The references including Otsuki and Olewine teach a method for forming an MIM capacitor as applied to claims 1-16 above, in which Olewine teaches (at paragraphs 55; 50-58; Figs 1-5) annealing a capacitor bottom electrode of TiN with nitrogen prior to deposition of the insulation layer of the capacitor (re claim 17,19). Re claim 18, wherein the top electrode 66 deposited from thermal CVD by using $TiCl_4$ is substantially organic-free content (col 7, lines 56 through col 8; col 6, line 65 through col 7, lines 55). Re claim 20, wherein the electrode is deposited at a temperature including about 400°C (col 14, lines 30-35; col 8,lines 35-41).

The references including Otsuki lack subjecting the bottom electrode to a chemical mechanical planarization.

However, Iizuka teaches (at Figs 7-8;9I-9J; paragraph 87; 112,100-112) forming and subjecting a bottom lower electrode 34 to a chemical mechanical planarization (CMP).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a capacitor structure of the references including Otsuki by subjecting the bottom electrode to a chemical mechanical planarization (CMP), as taught by Iizuka. This is because of the desirability to form a planar and thin capacitor structure as the electrodes are recessed in an opening of an insulating layer.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs-16

Michael Trinh
Primary Examiner